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EXAMINER

TUNG, TA HSUNG

| ART UNIT | PAPER NUMBER |
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1753

DATE MAILED: 07/02/2003

5

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/029,659

Applicant(s)

PROHASKA

etal

Examiner

T. TUNG

Group Art Unit

1753

Paper No. 5

— The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address —

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- ☐ Responsive to communication(s) filed on _____
- ☐ This action is **FINAL**.
- ☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- ☒ Claim(s) 1-19 is/are pending in the application.
- ☐ Of the above claim(s) _____ is/are withdrawn from consideration.
- ☐ Claim(s) _____ is/are allowed.
- ☒ Claim(s) 1-19 is/are rejected.
- ☐ Claim(s) _____ is/are objected to.
- ☐ Claim(s) _____ are subject to restriction or election requirement

Application Papers

- ☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.
- ☐ The drawing(s) filed on _____ is/are objected to by the Examiner
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

- ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).
- ☐ All ☐ Some* ☐ None of the:
 - ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____
 - ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____

Attachment(s)

- ☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____
- ☒ Notice of Reference(s) Cited, PTO-892
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Interview Summary, PTO-413
- ☐ Notice of Informal Patent Application, PTO-152
- ☐ Other _____

Office Action Summary

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Claims 1-19 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The disclosure is confusing. Applicant's claim language calls for a "dry ionomer membrane acts as an electrolyte" (e.g. claim 1, line 6). It is well-known (see col. 3, line 37 of Madou 4,812,221), and confirmed by applicant's own claim 3, that a Nafion ionomer membrane must be hydrated to render it proton conducting and therefore be capable of acting as an electrolyte. Accordingly, applicant's recitation of a dry Nafion ionomer acting as an electrolyte appears to directly contradict common knowledge in the art.

The specification describes element 1 of figure 1 as a "substrate" (page 14, line 10) and element 21 as a chip that is an extension or continued piece of the substrate (page 15, lines 6-7). However, element 21 is shown in figure 1 to be separate and distinct from substrate 1. To add to the confusion, if element 1 is the substrate, electrodes 4, 5 and 7 are not seen to be in contact therewith. If so, the wording at claim 1, line 3, "a sensing electrode in contact with said substrate", while having support in figures 6 and 7, would be inconsistent with figure 1. Is this what applicant intended?

The subject matter of claims 17 and 18 is not adequately disclosed. These claims call for a sensor with an opening both in the substrate and in the ionomer. Where is the supporting disclosure of this in the specification and the drawings, and how would such a sensor function?

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Further, the embodiment of figure 6 is confusing. Here the gas opening 2 runs through substrate 1, but not the ionomer 8. It appears that a gas coming from opening 2 would not be able to contact the ionomer. How then would the 3-phase contact among the gas, the sensing electrode and the ionomer, which is a key to applicant's invention (page 14, line 16 of the specification), be effected?

Claims 1-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1, line 6, "dry ionomer membrane acts as an electrolyte" is seen to be misdescriptive, as discussed before.

It is unclear what is the final product being claimed in the apparatus claims. If a dry ionomer is being claimed, it would appear that the apparatus claims are drawn to a sensor in the pre-operation state (before it is being used). Is this what is intended by applicant?

Claims 8 and 19, the wording in the last two lines is vague in that it is unclear how the second electrode operatively connects the ionomer, the first electrode and the second electrode.

Claim 11, lines 2-3, "said inlet" does not have antecedent basis, because parent claim 8 recites "opening" at line 4. It is noted that claim 1 recites "inlet" for this same element. Applicant should choose one or the other expression, but be consistent throughout.

Claim 14, lines 1 and 2, "obtaining" is not consistent with "providing" in parent claim 8, line 3.

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Madou et al 4,812,221 in view of Razaq 5,322,602, Tomantschger et al 5,302,274 or LaConti et al 4,820,386, with or without Halvorsen 3,211,638 or Busby et al 3,055,759.

Madou discloses a gas sensor comprising a substrate 12 with a diffusion opening 18. A sensing electrode 20, a counter electrode 24 and optionally a reference electrode 25 are deposited on the substrate, with the sensing electrode being aligned with the opening 18. A Nafion ionomer membrane 26 covers the electrodes and contacts the substrate. See col. 2, line 50 to col. 6, line 65. Madou discloses his ionomer to need hydration before it can conduct ions and act as an electrolyte, while applicant's claims call for the ionomer to be dry. It is not totally clear if the patent's ionomer is dry at the time it is being assembled into the sensor. In a typical process for making the sensor, the ionomer is deposited over the electrodes (see Razaq 5,322,602 at col. 6, lines 48-50 thereof). The ionomer being deposited presumably would be dry at that point, because moisture would be incompatible with the deposition process. If Madou's ionomer is also assembled in this manner, it would presumably be dry at the time of assembly. However, for the

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purpose of this rejection and giving applicant the benefit of the doubt, it is presumed that Madou does not disclose a dry ionomer at the time of assembly.

Razaq discloses treating (hydrating) an ionomer EL of a gas sensor either during or after depositing the ionomer over the electrodes of the sensor. This would appear to suggest that the ionomer is dry when it is first formed in the sensor. See col. 6, line 50.

Tomantschger discloses packing an electrolyte chamber with a matrix before a liquid is injected. See col. 8, line 23.

LaConti discloses the use of water vapor instead of liquid water for the needed hydration for an ionomer. The water vapor reaches the ionomer through a membrane. See col. 11, line 39. The ionomer when it is first assembled would not be subjected to liquid water and thus would be dry.

It would have been obvious for Madou to provide his ionomer in dry form in the sensor prior to use. This is so because analogous prior art (Razaq, Tomantschger, LaConti) discloses that to be known. Also, the prior art is apparently aware of the “flooding” problem of ionomer membranes, as discussed in paragraph 00026 of the specification. Applicant should confirm in his response that he concedes the “flooding” problem to be a known problem. A pre-use dry ionomer would be expected by one of ordinary skill in the art to alleviate the “flooding” phenomenon.

Further, it is a known technique to withhold an electrolyte in a rupturable container prior to use and then rupturing the container to activate the sensor when it is being put to use. See Halvorsen (the paragraph bridging columns 3 and 4) or Busby (col. 3, line 35). It would have

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been obvious for Madou to withhold the hydrating liquid in a container that can be penetrated to activate the sensor at the desired time. Clearly, there is no need to activate the sensor prior to use. The liquid would merely evaporate and go to waste. Further, it would simply be good sense not to assemble an ionomer in the wet state. Processing steps during assembly may be incompatible with a wet ionomer.

In regard to claim 4, see col. 6, lines 49-52 of the patent.

In regard to method claims 8-19, even though Madou does not appear to set forth a method for making the sensor, applicant's claims merely recite necessary and inherent steps for making the sensor.

Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Madou et al in view of Razaq, Tomantschger et al or LaConti et al, with or without Halvorsen or Busby et al and Otagawa et al.

These claims further differ by calling for a gas opening in the ionomer.

Otagawa discloses a gas opening in an ionomer 28, 226. See figures 1, 4 and 8; col. 5, line 17 to col. 6, line 18 and the paragraph bridging columns 8 and 9. It would have been obvious for Madou to incorporate a gas opening in the ionomer, because that is an efficient design for effecting a 3-phase contact among the sample gas, the sensing electrode and the ionomer.

Claims 1-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Madou et al in view of Razaq or Otagawa et al 4,900,405.

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Razaq (col. 6, lines 48-50) or Otagawa (col. 10, line 47) discloses forming a gas sensor by depositing an ionomer over the electrodes of the sensor. It would have been obvious for Madou to provide his ionomer in the same manner as Razaq or Otagawa, because the ionomer is a thin film layer that is formed most efficiently in situ. It would make no sense to form the ionomer layer elsewhere and then somehow assemble the same over the electrodes. The deposited ionomer layer presumably would be dry, because moisture is incompatible with the deposition process.

As for claims 17-19, note that Otagawa forms a gas opening in the ionomer 28, 226. See figures 1, 4 and 8. It would have been obvious for Madou to do the same, because such a structure provides an efficient design to effect a 3-phase contact among the sample gas, the ionomer and the sensing electrode.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 19 is rejected under 35 U.S.C. 102(b) as being anticipated by Otagawa et al.

As discussed before, Otagawa discloses forming a sensing electrode, a counter electrode and a reference electrode on a substrate. A Nafion ionomer contacts the substrate and the electrodes. The ionomer has gas openings therein to expose a portion 26 of the sensing electrode

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to effect a 3-phase contact among a sample gas, the sensing electrode and the ionomer. See figures 1, 4 and 8; col. 5, line 17 to col. 16, line 18 and the paragraph bridging columns 8 and 9. At col. 10, line 47, the patent discloses the ionomer to be formed in situ by deposition over the electrodes. The thusly formed ionomer is presumably dry, because moisture would be incompatible with the deposition process.

Claims 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Otagawa et al in view of Razaq, Tomantscher et al or LaConti et al, with or without Halvorsen or Busby et al.

As discussed before, Otagawa discloses a sensor wherein a Nafion ionomer electrolyte 28, 226 has gas openings therethrough. If the Otagawa ionomer is construed as not to be dry when it is being formed, applicant's claim would differ in that respect.

As discussed before, Razaq, Tomantschger or LaConti is seen to suggest a dry pre-use ionomer. Halvorsen or Busby is considered to reinforce the obviousness of keeping the ionomer dry until the sensor needs to be activated for use.

As for the steps recited in applicant's claim, they are necessary and inherent for making the sensor.

Kosek et al 5,527,446 discloses a potentiodynamic circuit for a sensor. See col. 5, line 24.

The examiner can be reached at 703-308-3329. His supervisor Nam Nguyen can be reached at 703-308-3322. Any general inquiry should be directed to the receptionist at 703-308-0661. A fax number for TC 1700 is 703-872-9310.

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A handwritten signature in black ink, appearing to read 'Ta Tung', with a stylized, cursive flourish.

Ta Tung

Primary Examiner

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